

SAND LAKE NATIONAL WILDLIFE REFUGE

NARRATIVE REPORT

SEPTEMBER 1, 1952 - DECEMBER 31, 1952

PERSONNEL

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Sand Lake National Wildlife Refuge
September 1, 1952 to December 31, 1952

I GENERAL

A. Weather Conditions

A summary of data recorded at the official weather station located at refuge headquarters is given in Table No. 1.

TABLE NO. 1

| MONTH | SNOWFALL | | PRECIPITATION | | MAX. TEMP. | | MIN. TEMP. | |
|-------|----------|-----|---------------|------|------------|-----|------------|-----|
| | '51 | '52 | '51 | '52 | '51 | '52 | '51 | '52 |
| Sept. | - | - | .47 | .18 | 86 | 95 | 22 | 31 |
| Oct. | 3.0 | - | 1.38 | T | 80 | 77 | 16 | 08 |
| Nov. | T | - | - | 1.21 | 54 | 70 | -4 | -3 |
| Dec. | 7.0 | T | .50 | .06 | 51 | 40 | -27 | -6 |
| TOTAL | 10.0 | T | 2.35 | 1.45 | 86 | 95 | -27 | -6 |

Weather during this period was quite unusual for this section of the state. Very light frost occurred on September 13, but killing frost was not recorded until October 5. Temperatures ranged above normal for the entire period with a high of 95 recorded on September 9 and 10. Low for the period was -6 recorded on December 16.

Precipitation was far below normal during September and October. The first snow fell on December 5 and it barely covered the ground. At the close of the period there was only scattered spots of snow visible on the ground, compared to 10 inches on the level at the close of the same period in 1951.

B. Water conditions

The continued drouth through this period has kept the Columbia dam at below the authorized spillway level of 1270.3. At the close of the period the reading at the Columbia dam was ~~1258.8~~ 1268.8. A slight flow has been noted at the Mud Lake dam.

Due to the mild fall no freezing of main water areas occurred until November 26-27 during which time the entire lake froze over except for a portion of the James River channel below Mud Lake dike. As of December 31, 1952 there is approximately 14 inches of ice on Sand Lake proper.

C. Fires

No fires occurred during this period. No burning permits were issued.

II WILDLIFE

A. Migratory Birds

1. Population and Behavior

a. Whistling Swan: The first observation of these birds was made on October 10 when 5 were seen in the Mud Lake area. Thereafter groups of swans were seen frequently from Mud Lake north to the four-mile grade and occasionally in Silo Bay, Sand Lake proper. A peak population of 61 swans was reached on November 23, but almost all of these birds had moved out of the refuge by November 25, just preceding the Thanksgiving Day freeze-up. One adult and one cygnet remained near open water at the Mud Lake spillway until the second week in December. Young-adult composition of family groups is as follows: Two families composed of 2 adults and 3 cygnets, three families of 2 adults and 2 cygnets, four families of 2 adults and 1 cygnet, and one family (?) group of 3 adults and 2 cygnets.

b. Geese: Migrating geese began to appear on the refuge on September 18, when 500 Richardson's geese and 40 white-fronts arrived to bolster the resident population of 200 common Canadas. Geese continued to drift into the refuge, and when the waterfowl hunting season opened on October 3, there were approximately 4,500 geese present, Richardson's predominating. With the arrival of 200 snow and 50 blue geese on October 7, all species of geese common to the refuge during fall migration were present.

The weather remained mild and the numbers of geese continued to increase. Definite movements were noted on October 9 and 21.

Peak numbers of white-fronts were observed during the aerial census on October 17. A total goose population peak of 20,000, approximately 90% Richardson's, was reached on October 23. The first cold snap occurred on the night of October 26-27, and although warm fall weather was resumed the following day, it was evident that many geese had moved out. By the end of the month only 5,000 geese remained. The decline continued until the freeze-up came, November 27, when 250 common Canada geese were all that remained. Twenty "honkers" are still using the refuge at the end of the period. Table No. 2 summarizes aerial census data covering the migration period. Table No. 3 compares 1951-1952 peak population of each species.

This year's goose population high represents a 74% decrease from the record 1951 peak of 77,000. Graphic comparison of the populations of 1951 and 1952 can be found in Figure 1. There was but an insignificant 11% drop in the Canada goose population and the decrease in total goose population is a result of the absence of snows and blues. The highest number of snows and blues recorded this year was 3,000, a 95% decrease from last year.

According to observations by refuge personnel and reports from local residents, there was a movement of snows and blues through the area on October 24 and 25, but they did not stop. The reasons for this are somewhat obscure. The weather was mild, there was adequate open water, and there was abundant corn and small grains. However, the weather throughout the late summer and fall was abnormally dry. Waste grain left in fields as a result of harvesting operations, which ordinarily germinated when wet by early fall rains produced no green browse, nor was there any other good goose browse available. It is believed that this is one of the reasons for reduced snow-blue goose use. Other factors that make these two species so unpredictable are no ~~doubt~~ involved.

doubt

The fall Canada goose population, which is composed predominantly of Richardson's geese, was only slightly under the 1951 level of 20,000. This is about 50 percent of the peak 1950 figure. It was believed that competition for foods with the high snow-blue numbers was a major factor involved in the decrease in recorded numbers last year. This year the lack of desirable browse appears to have affected the Richardson's goose fall movements. Band returns from areas south of Sand Lake seem to indicate that they followed the same route as previous years, but they had passed through the northern areas (including Sand Lake) earlier in the fall than usual. A trap sample of 203 Richardson's reveals an age ratio of 130 young/adult. If this can be considered an adequate sample, it would indicate a good hatch this year, and an increase in the Richardson's goose population should show up in the winter waterfowl inventory. At any rate, it is still impossible to make any definite statements as to the status of the Sand Lake Richardson's goose population, and it will continue to be impossible until our data can be correlated with data obtained from other sources along the flyway.

An attempt to differentiate between the common Canada's and Richardson's geese during aerial censuses, met with little success by the observer. However, other observations made during the period indicated that the common Canada goose population was about equal to last year.

The goose flock seldom left the refuge and most feeding was done on refuge cropland. It was common for hunters in some areas to watch up to 1,000 geese feeding in the refuge within 200-300 yards of the boundary shooting line.

c. Ducks: Ducks began moving into the refuge in August, and the summer population of 18,500 had increased to 33,000 by September 9. The species composition was 48 percent pintail, 25 percent mallard, 14 percent shoveller, and smaller numbers of the teals, gadwalls, baldpates, blacks, redheads, and ringnecks. This high incidence of pintails no doubt reflects the tremendous increase in breeding pintails on the refuge and in surrounding areas the past spring and summer.

For the next three weeks, there was gradual movement out of the refuge until on September 29, only 10,500 ducks remained. The dominant species was

shoveller, a record high of 8,000. Although their numbers declined as the season progressed, mild weather coupled with lowwater levels, which created ideal feeding conditions, induced considerable numbers to remain far into November.

The aerial census of October 7 revealed that little change in total population had occurred, but mallards had moved in to take the place of some of the shovellers and pintails that had moved out. Mallards continued to arrive in ever increasing numbers until on October 29, 117,000 ducks were present. During the first week in November, a loss of 42,000 ducks was recorded. This decline was followed by a tremendous influx of mallards until a peak population of 225,000 was reached on November 25. The freeze-up on November 27 produced a mass exodus of birds so that by the end of the waterfowl hunting season (Dec. 1), approximately 40,000 ducks remained. An aerial count on December 12 revealed that 6,500 mallards and a few blacks were left. These birds apparently intend to spend the winter here, since they are still present at the end of the period. Figure 2 summarized fall duck movements for the past 2 years.

This double peak seems to be characteristic of fall movements of ducks through this area. One population, assumed to be birds from the Dakotas and Southern Canada, produced one peak late in October, followed by a decline. Then follows the second increase and higher peak in November the "northern flight". This has been observed for the past 5 years, excluding 1951 when blizzard conditions, low temperatures, and an early freeze-up apparently forced the "northern flight" to pass through the area. In Figure 2, the shape of the curve for 1952 can be considered representative of the 1948, 1949, and 1950 populations, with minor modifications. Data prior to 1948 was found to be insufficient for comparison purposes.

The population of diver species this year was considerably under that of 1951. Canvasbacks were abundant in the pothole country to the east and west of the refuge, but 14,000 "cans" was the highest number recorded for Sand Lake, a decrease of 82 percent from last year. The usual flight of lesser scaup did not use the refuge this year, although occasional observations of this species were made. Apparently, extremely low water levels was responsible. Goldeneyes and buffleheads never abundant here, were observed occasionally. Approximately 200 American mergansers appeared just prior to the freeze-up.

Coot: Coots were present in abundance approximately equal to 1951. A peak of 9,000 was observed on October 23. None were observed after November 1.

White Pelicans: Movement of pelicans into the refuge began during midsummer, adding to the summer resident population, and on September 29 a high of 6,500 pelicans was observed. The numbers decreased from that date and on November 12, two remained. A number of these "snow geese" were shot by goose hunters, five dead birds being found along one half-mile of fence line. One injured pelican was seen using the open water at the Mud Lake spillway until December 12.

TABLE NO. 2

SUMMARY OF AERIAL CENSUS DATA

| | Sept. 9 | Sept. 29 | Oct. 7 | Oct. 17 | Oct. 23 | Oct. 29 | Nov. 6 | Nov. 12 | Nov. 25** | Dec. 12 |
|---------------------|---------|----------|----------|----------|----------|-----------|----------|-----------|-----------|---------|
| Canada goose* | 200 | : 2,400 | : 5,800 | : 10,000 | : 18,500 | : 4,000 | : 2,000 | : 1,700 | : 250 | : 150 |
| White-fronted goose | : | 200 | : 400 | : 1,000 | : P | : P | : P | : | : | : |
| Snow goose | : | : | 200 | : 700 | : 1,300 | : 2,700 | : 1,000 | : 900 | : | : |
| Blue goose | : | : | 50 | : 100 | : 200 | : 300 | : 100 | : 100 | : | : |
| Total Geese | 200 | : 2,600 | : 6,450 | : 11,500 | : 20,000 | : 7,000 | : 3,100 | : 2,700 | : 250 | : 150 |
| Ducks | 33,000 | : 10,500 | : 10,000 | : 30,000 | : 50,000 | : 117,000 | : 75,000 | : 178,000 | : 225,000 | : 6,500 |

* Includes all white-cheeked species.

** Not an aerial count. Estimate based on count of ducks seen flying out of refuge.

P Present in limited numbers.

TABLE NO. 3

COMPARISON OF PEAK POPULATIONS
BY SPECIES 1951-1952

| CANADA GOOSE | | : | WHITE-FRONTED GOOSE | | : | SNOW AND BLUE GOOSE | | : | PEAK POPULATIONS |
|--------------|--------------|---|---------------------|---|--------------|---------------------|--------------|---|---------------------|
| 1951 | 20,800 | : | 3,000 | : | 57,000 | : | 77,000 | | |
| | Oct. 24 | : | Oct. 18 | : | Oct. 24 | : | Oct. 24 | | |
| 1952 | 18,500 | : | 1,000 | : | 3,000 | : | 20,000 | | |
| | Oct. 23 | : | Oct. 17 | : | Oct. 29 | : | Oct. 23 | | |
| <hr/> | | | | | | | | | |
| % Change | 11% decrease | : | 67% decrease | : | 95% decrease | : | 74% decrease | | |

FALL DUCK POPULATIONS

— 1952
— 1951

225,000

200,000

150,000

100,000

50,000

10,000

10 20
September

10 20
October

10 20
November

10 20
December



FALL GOOSE POPULATIONS

— 1952
— 1951

60,000

70,000

60,000

50,000

40,000

30,000

20,000

10,000

10 September

10 October

10 November

10 December



f. Double-crested Cormorants: These birds were observed until mid-October. Peak populations of 3,000 birds occurred on September 9 and 29th. These birds, too, suffer at the hands of goose hunters, some of whom don't even know "what kind of a goose I've shot".

g. Heron, Grebes and Cranes: Great blue herons were seen during the period through the first week in November.

Western grebes were present until the end of the first week in October. Two sandhill cranes were observed flying to the east side of the refuge in the early morning on October 9.

h. Shorebirds & Gulls: Observations on all but the most prominent shorebirds were neglected when ducks and geese became abundant. Avocets were seen frequenting mud flats and shallow water in flocks of up to 18 birds, but had disappeared in mid-November. Greater and lesser yellowlegs were common until the end of October. A flock of 20 long-billed dowitchers was observed in the Weismantel pool on October 27, but were not seen thereafter. It did appear, however that shorebirds remained for a longer period this year to enjoy mild fall weather and ideal feeding conditions. Wilson's snipe were seen occasionally. Franklin's gulls were common until November 12. Ring-billed & herring gulls were last observed on November 23.

2. Food and cover:

Natural and cultivated waterfowl foods were more than adequate this year, since the anticipated high goose population failed to materialize. A fair amount of corn and small grains was produced on the refuge, but lack of moisture resulted in an almost total lack of good goose browse. Mud flat plantings of Japanese and wild millet were not too successful due to early summer rains which washed away much of the seed. Lower water levels again this year aided in the production of submerged aquatics and marsh-edge vegetation.

Unusually dry weather conditions during the summer resulted in lower crop yields this year. The refuge share of cultivated crops was 710 acres, of which 595 acres were left in the fields unharvested. This acreage was composed of wheat 17 acres, oats 17 acres, barley 102 acres, corn 270 acres, and millet 169 acres, and provided 12,000 bushels of available waterfowl foods. This is approximately one-half of the amount which was available last fall. However, only a part of the food was used this year as compared with almost 100 percent utilization in 1951. The absence of snows and blues was of course, the major factor involved. All foods (except submerged aquatics in the shallower ice covered areas) were available throughout most of the period because there was no snow cover.

Geese fed principally on small grains, making particular use of agricultural millet that had been mowed and left where it lay. They consumed very little corn, possibly because the weather remained warm and they did not require a high-protein diet. Dabblers fed mostly on grainfields within the refuge early in the fall. Later, when cooler weather arrived,

their food preference changed to corn. Although standing corn was plentiful on the refuge, spectacular flights of mallards moved out to feed in picked cornfields in surrounding areas. Beds of sago pondweed were the favored feeding areas of divers during their stay. An abundant supply of food remains, and will no doubt be utilized by upland game and deer this winter, and by waterfowl next spring.

The wild fluctuations in goose populations each year make food planning difficult. An ample supply must be produced to provide for the maximum numbers of waterfowl anticipated, to prevent excessive kill. This was illustrated last year when the food supply was exhausted early in the season, and geese began moving to areas outside the refuge with a subsequent increase in kill. Also sufficient foods must be kept on hand to combat possible fall depredations.

3. Disease:

Botulism or toxic algae occurred from mid-August to mid-September. A full report of the outbreak is included in the narrative report of the preceding period.

Botulism was reported by South Dakota game technicians in many areas of the state in mid-October, but none was detected at Sand Lake.

Lead shot poisoning:

Ducks suffering from lead shot poisoning contracted outside the refuge began to show up during the middle of November. More open water dispersed concentrations of ducks, and it was impossible to determine accurately the extent of the sickness. It is estimated that approximately 1,000 ducks died from the disease. This is considerably fewer than last year. The exceptionally mild weather permitted more ducks to recover, and it is thought that a smaller percentage of the population was affected because weather conditions produced poor shooting during most of the season.

B. Upland Game Birds

1. Population and Behavior

a. Ring-necked pheasant: Last year^a successful aerial census of pheasants was made, and is included in our plans again for this winter. However, it has not been completed yet, and no accurate pheasant population figures are on hand. The birds are abundant, but the number of pheasants on the refuge does not appear quite as high as last year. There have been no blizzards, little snowfall, and mild temperatures, with the result that the birds are dispersed. Many pheasants that enter the refuge to take advantage of good winter cover and food have apparently remained in outlying areas.

The pheasant hunting season lasted from October 18 to November 1, with a limit of 3 male birds permitted. Birds were plentiful and success was good

early in the season, but hunters experienced difficulty in locating and flushing pheasants as the season advanced. Many hunters toured the roads close to the refuge boundaries.

There has been no winter mortality of pheasants, and very few road kills in the vicinity of the refuge.

b. Hungarian Partridge: Coveys of huns have been observed occasionally throughout the period, although the estimated population in the refuge has declined. Possibly, coveys that enter the refuge in the winter have remained in outside areas. Fall observations throughout the vicinity of the refuge indicate that the species is at last holding its own in this part of the state.

c. Pinnated Grouse: In past years, none of this species have been observed in the summer; It appears that the birds migrate into the refuge during the winter. This year food and sufficient cover has been available outside the refuge, and only a few pinnated grouse have been observed on the refuge. A flock of 3 birds observed on December 21 is the most that has been seen at any one time.

2. Food and Cover

Limited use of refuge foods by waterfowl has left plentiful supply of wild and cultivated foods for use by pheasants and because there has been no snowfall, most of it is available. Mild temperatures and the absence of blizzard conditions have permitted pheasants to range over wide areas to fully utilize all food sources. This has resulted in lower use of foods adjacent to shelterbelts, much of which is corn, and should severe weather conditions occur, good food supplies will be close at hand. Supplementary foods as caragana, buffaloberry, Russian olive, honeysuckle form a part of the shelterbelts.

Good cover is found in extensive shelterbelts and marsh vegetation on the refuge.

C. Big Game Animals

1. White-tailed Deer:

The winter aerial deer census has not been made yet. An estimate based on the aerial count last January, and consideration of factors over the past spring, summer and fall places the present refuge deer population at approximately 225. There was no hunting season this year, but by next fall the population will be approximately 350 or more, and a harvest will be necessary. The white-tails have not yet grouped into the usual concentrations, and have been observed frequently in groups of one, two or three animals throughout the refuge. The deer appear to be in good physical condition.

The big mortality factor this fall has been (excluding undetected poaching) the automobile. Twelve deer have been killed by cars along the

Columbia road and the Hecla grade.

2. Food and Cover

Food appears to be adequate and deer have been seen feeding on cornfields in many different areas throughout the refuge. No excessive browsing of shelterbelts has occurred.

D. Fur Animals, Predators, Rodents and other Mammals.

1. Fur Animals

The principal species of fur animals on the refuge are muskrat, mink, weasel, raccoon, badger and red fox.

In the past muskrat has been the valuable fur resource and an important unit in the ecology of the marsh, but since the mid-'40's the "rat" population has declined. This year, the population was estimated at 1,000, a very small figure considering the large acreage of marsh, and populations of former years. The water level was extremely low, measuring 1 1/2 feet below 0 - 0 on the Sand Lake gauge. Bank dens were left high and dry, and there probably aren't over 80 active rat houses on the marsh this year. This is directly the opposite of conditions on other marsh areas in the vicinity where high muskrat populations exist. It appears that many of the rats have moved out of the refuge to portions of the James River channel earlier in the fall. A thorough study of the muskrat situation is in order.

Mink have increased, and a high population estimated at 75 or more is present. They were sighted frequently, probably due in part to low water levels. A total of 30 mink had been trapped by the end of the period, and have assumed the leading role as the economic fur resource. Weasel have been observed often, and one in the display pool area was seen on 5 different occasions and was subsequently removed.

High populations of raccoon and skunk have necessitated their removal. Raccoon and skunk have become the staple on the trappers menu. A new method of taking coon has been discovered by the trappers. Groups of them have been found sleeping curled up in dense stands of phragmites, and a club is the "trap" used to collect them.

The red fox population is almost equal to that of last year, but no definite data concerning their behavior and food habits has been noticed. Tracks believed to belong to two coyotes have been seen in the snow.

2. Rodents

Most species of ground squirrels have been in hibernation since early October. House mice and rats have been controlled by the use of Warfarin. Both jackrabbits and cottontail are plentiful, but no damage to shelterbelts has been observed.

E. Predacious Birds

Great horned owls are not over abundant and present no known problems.

One Snowy owl has been seen on the refuge in December.

Fluctuating numbers of golden and bald eagles have been observed throughout the period. One adult bald eagle and one adult golden eagle are present at the end of the season. Occasional observations of American rough-legged hawks have been made, and one prairie falcon was sighted in mid-December. Marsh hawks also have been present during the period. No doubt all of these species have been feeding to some extent on lead poisoned ducks.

A few magpies were seen during the fall beginning in October. Two are still using the refuge at the end of the period.

III REFUGE DEVELOPMENT - MAINTENANCE

A. Physical Development

1. One thousand six hundred thirty yards of oversize gravel was placed on Mud Lake dike and four hundred four yards on Columbia dam to repair damages done by the spring floods.

2. The Tewaukon Cabin was added to the clerks residence and a basement dug. A new forced air furnace was installed in basement plus water and sewage systems.

3. New asphalt shingles were placed on the residence at site No. 2.

4. Approximately 5,050 yards of dirt fill was placed over a 3/4 mile stretch for a dike and patrol road east of Silo bay.

5. The goose and duck hospital was enlarged to accomodate more birds. An addition, fifty feet square, six and one half feet high and completely covered was placed on the east side of the original pens. Salvaged animal wire was used with new cedar posts. New creosoted planks were installed around the bottom of the fence to prevent small ducks from escaping and stray dogs from getting in. The water supply-pool was cleaned out and repaired and the overflow paved with old side walk squares to eliminate the mud. Two large automatic feeders were installed that can readily be reached by jeep in the winter; this will do away with carrying in grain by hand when the snow is deep. The wire around the large outside pen was all tightened and the gate posts braced.

6. A new oil burner was installed in the shop. Fuel was piped in from a 250 gallon tank set up outside the service building.

7. Repairs were made to storm sash on all residences and broken windows were replaced in several buildings.

8. Approximately 250 yards of dirt fill was placed over 1/4 mile of patrol road near Forseth Shack. This was to repair flood damage.

9. The door on the north equipment shed was made 2 feet wider so as to be able to get the Autocar and snow plow inside.

10. Refuge trails and weed patches around buildings sites were mown during the period.

11. Complete overhauls were performed on the Unit dragline motor, 1948 International, I-19217, 1948 Ford Sedan, I-18263 and the Hercules motor with pump.

12. Minor repairs were made on Jeep pickup I-19062, 1946 International I-16933 and Ford Sedan I-18263.

B. Plantings:

1. Aquatic and Marsh Plants: None

2. Trees and Shrubs: None

3. Upland Herbaceous Plants: None

4. Cultivated Crops:

Nineteen permits were in force under which 3,146 acres of cultivated crops were grown on Sand Lake Refuge fields. Crops grown on the 3,146 acres were: Wheat 1500 acres, barley 481 acres, Oats 465 acres, Corn 531 acres, and millet 169 acres. The refuge share amounted to 710 acres, yielding an estimated total of 13,820 bushels of which approximately 11,824 bushel was left in the field.

Ducks and geese made good use of the 169 acres of millet left in the fields in different parts of the refuge as well as other small grains. Due to the ideal fall the farmers were able to get their corn picked early this fall. The corn stalks were very dry and brittle this fall and much of the corn picked, shelled out and dropped in the field leaving hundreds of bushels for the birds.

Due to the early departure of the geese there is much small grain and corn in the fields for them to consume upon their return next spring.

As of December 31, 4,322 pounds of alfalfa seed has been delivered as our share of the crop. Approximately 1,000 pounds is yet to be delivered. We asked the permittees to clean the seed before delivering it to us so that it can be shipped to the different refuges ready to be sown.

IV ECONOMIC USE OF REFUGE

A. Grazing:

Three permits were in force covering 600 acres. Grazing is permitted on refuge units from July 15 - November 15 at the rate of one head per five acres at \$1.00 per A.U.M. Grazing rates were increased from \$.60 per A.U.M. to \$1.00 per A.U.M. to more closely conform with local grazing rates. Total receipts from grazing units amounted to \$432.66.

B. Haying:

Haying permits were issued to ten permittees covering approximately 900 acres of hay land. Some hay units could not be fully utilized due to spring floods leaving piles of debris on the hay land. Most of the debris was cleared off this hayland this period, however. Five hundred fifty one tons of hay were harvested this year bringing a total income of \$774.55.

C. Fur Harvest:

In accordance with the Fur Management Plan prepared by the Refuge Manager the removal of the following animals was authorized to be taken from November 15 through February 15, 1953: Mink, skunk, raccoon, badger, weasel and red fox. The number of each species permitted to be removed were: Mink 30, skunk 100, raccoon 100, badger 50, weasel 10 and red fox 10. No muskrats are being removed this year.

As of December 31, 30 mink, 66 skunk, 78 raccoon, 10 badger and 5 weasel have been reported taken by the trappers. Mink are divided between refuge and trappers on a 50-50 basis. All other furs are retained by the trappers.

D. Timber Removal: None

E. Other Uses:

A permit was issued for placing 52 bee hives on the refuge at the rate of \$.15 per hive.

V FIELD INVESTIGATIONS

Banding:

Plans were laid in early fall to band and neck-mark geese (Richardson's) in order that additional data might be obtained relative to their pattern of refuge use. But the number of geese on the refuge was smaller than usual which resulted in poor trapping. A total of 203 geese were caught of which 177 were marked with plastic collars.

Several colors were tried: White, blue, orange, red and red-orange. It was found that the lighter red and orange collars were best from the standpoint of visibility. A collar 1 1/4" wide by 5 1/2" long made from the heavier plastic such as Koraseal proved most durable. Experience has shown that these collars must be stiff enough to prevent "rolling",

sufficiently tough so as not to become brittle and tear when exposed to low temperatures, and roomy enough to enable the bird to eat. A test suggested for the latter feature is to leave room enough for ones index finger between the goose's neck and the collar.

The collars were fastened with office staples as it was intended that they drop off in a couple of months. We understand that "grippers", such as are used on clothing as a substitute for buttons, will provide a much longer lasting means of fastening. It would be important to use something of that order for marking birds like the ring-necked pheasant which, we discovered last winter, will quickly tear out the office staples by scratching.

So far, ⁴sight returns from the neck-marked geese have been received - all from the Salt Plains Refuge in Oklahoma. Band returns (i.e. shot by hunters or found dead) from 1952 bandings were as follows for Richardson's geese:

| | |
|----------------------|---|
| South Dakota (local) | 7 |
| Oklahoma | 1 |
| Kansas | 1 |
| Texas | 2 |

| | |
|-------|----|
| Total | 11 |
|-------|----|

Total 1952 bandings 203

Returns this period from Richardson's geese banded last year (1951) are as follows:

| | |
|--------------------------------|---|
| North Dakota | 1 |
| South Dakota (local Sand Lake) | 2 |
| Kansas | 2 |
| Oklahoma | 1 |
| Texas | 1 |

| | |
|-------|---|
| Total | 8 |
|-------|---|

Total 1951 bandings 485

Total 1951 returns (direct) 48

As stated in the waterfowl section of this report, the usual numbers of geese did not stay at Sand Lake this fall. That Richardson's geese

passed on thru is shown by the dates and distribution of the above band returns.

It is also interesting to note that there are no returns from Canada from our 1951 bandings. This may indicate less gun pressure on Richardson's geese in the Provinces. Another point in this connection is that Richardson's geese did not stop on the south shore of Lake Winnipeg in anything like their usual numbers this fall. This information was related to us by Peter Ward of the Delta Station who said that goose shooting in that locale was poor. So perhaps a similar situation prevailed there as did at Sand Lake.

Five returns came in from the 100 odd snows and blues held over the winter of 1951-52 as cripples and released in our goose pen last April. Some of these were clipped so couldn't have left until September. Three of these returns were from South Dakota and two from Texas indicating that the hunters find recovered cripples quite acceptable.

Two returns appeared from lesser snows banded in 1951; these were shot in October, 1952 - one locally and one 15 miles west of St. Frances, Ontario, Canada.

One "honker" return came in from the Missouri River near Platte. This bird was shot in October, 1952 and had been banded out of the hospital pen in March, 1951 by our erstwhile associate, Harvey K. Nelson.

And speaking of Mr. Nelson recalls to mind the pelicans we banded on Mud Lake last summer at such great sacrifice to our olfactory senses. One of these was killed by a Mr. Keating of Shreveport, Louisiana and reported as a snow goose. Speculation is rife as to whether or not the man tried to eat his "goose".

Six band returns were received from ducks banded during the period which were as follows: Shoveller - one return from Tyndall, S. Dak., Mallard - two from North Dakota, one from South Dakota and one from Minnesota and Illinois. The five mallard returns were all from 96 mallards banded September 9, 1952. Oddly enough, the two North Dakota returns indicate a reverse migration of some sort, for these ducks were shot in Shetzman County (N. Dak.) the first week in October.

The following indirect returns were received during the period from approximately 1100 mallards banded in November 1951. A total of 19 direct returns had previously been received from these bandings:

| | | | |
|--------------|---|--------------|---|
| Saskatchewan | 7 | Alberta | 1 |
| North Dakota | 9 | South Dakota | 0 |
| Minnesota | 3 | Montana | 1 |
| Kansas | 1 | Missouri | 2 |
| Indiana | 1 | Louisiana | 1 |

Total 26

Over-wintering mallards in South Dakota at points such as Lake Andes,

Spearfish and Sand Lake have ^{been} classified as "unshot" populations and there has been much clamor from the sportsmen and, also, from certain game managers for more liberal regulations whereby more of these "refuge trained" ducks might go into the hunters' bags.

It would appear from the band returns by implication, at least, that these populations are hunted; certainly on the basis of this evidence, they cannot be considered as an entity or as individual "refuge" populations returning year after year to the same refuge. At any rate this hasn't happened at Sand Lake for there were no returns anywhere in the State. The scattered returns from south of us were mostly made in October showing that this year these birds passed us by. It would seem that mallards are creatures of the moment!! Perhaps the 2,000 odd mallards banded at Sand Lake after the 1952 (December) hunting season plus large scale bandings at Lake Andes this winter will provide enough additional data to clarify this situation.

The following is a summary of waterfowl banded at Sand Lake during the period.

| | | | |
|------------------|------|-------------------|------|
| Richardson geese | 203 | Blue-winged Teal | 14 |
| Mallard | 2420 | Green-winged Teal | 5 |
| Pintail | 31 | Black Duck | 5 |
| Shoveller | 17 | | |
| | | Total | 2695 |

In addition, approximately 35 crippled geese were trapped (as compared to 220 last year) and 41 large Canada "honkers" were retained for experimental purposes. The small number of geese shot around the boundary during hunting season is reflected in the correspondingly smaller number of cripples that were salvaged.

The Boom Trap

Reports from other stations around the country indicate that our boom trap is coming into general use more and more. As might be expected, with this more general use, its limitations became more pronounced and considerable thought has been devoted to an improved design.

A plan for an improved trap has been submitted. Pending construction of the new "super" model, one of its features was incorporated in the old standard trap, the results of which may be viewed in the picture section of this report.

Because of the variables involved such as response to bait and so on, it is difficult to state objectively to what extent the trap was improved. However, it was found that the average catch (ducks only) was increased from 70 birds per throw (17 throws) to 117 birds per throw (11 throws). Among the latter were three poor throws because of conditions beyond our control. Three times in five days we had approximately 300 mallards under the net after a cast. Many of these escaped because of the ^{shape} of the

net now in use. This, of course, is corrected in the improved net to be constructed. A total of 1297 mallards and black ducks were banded as a result of eleven throws in five days from December 12-19; a total of 49 1/2 man hours were required to catch and band these ducks.

A little research turned up some startling information: Average cost per duck was .065; total ducks per man hour were 24; these figures are for the entire operation on 2492 ducks. In spite of the much larger catches made as result of improvements to the trap, cost per bird and birds per man hour showed very little change! Fifty one man hours were required to trap and band 1191 ducks using the unimproved trap; Therefore, if the benefit of improvements to the trap is to be realized, improved handling and banding methods must be devised. This we have set out to accomplish along with developing the new trap. More about this in our April report.

The pursing of the net resulting in the larger catches described above was done by adding extra rubber bands to the trailing edge and the use of heavier charges. As a result, the leading edge reversed direction in mid-air, scooping in the extra ducks.

While effective, this crude adaptation is not recommended for general use as our present equipment is unsuitable and would not stand up long under the added strain.

Richardson's Geese - Weights and Measurements

Approximately 180 of the smaller geese were weighed. Measurements were obtained from bill, wing and tarsus. Our thought on obtaining these data was to break it down by age and sex groups and to examine on a statistical basis these attributes whereby ornithologists define speciation among white-cheeked geese. From this, perhaps we can decide how many forms of Canada geese are actually present at Sand Lake. Details of the "statistical treatment" are to be reported in the future. Meanwhile, the reader is referred to the picture section for an inkling of the difficulties one gets into on a project of this type.

VI PUBLIC RELATIONS

A. Recreational Uses

The Sand Lake and Hecla Recreation areas were used by groups for picnics until cold weather set in. Fishermen had fair luck at the Hecla Recreation area where good sized Northerns were caught and perch weighing up to 1 pound being reported.

An estimated 12,900 man days of periphery hunting as summarized in the section on hunting was provided by the refuge.

B. Refuge Visitors

| <u>NAME</u> | <u>TITLE OR AFFILIATION</u> | <u>DATE</u> |
|----------------------|-------------------------------------|-------------|
| Audrey M. Berg | Personnel Ass't. Regional Office | 10/5/52 |
| Cecil S. Williams | F.W.S. Washington, D. C. | 10/6/52 |
| Arthur Hawkins | Wildlife Research Biologist | 10/6/52 |
| Lloyd Ramelli | Refuge Mgr. Crescent Lake, Nebr. | 10/18/52 |
| Mr & Mrs C. Rollings | Ass't. Reg. Ref. Supervisor | 10/22/52 |
| Canan J. Castle | Faculty member, N.S.T.C. Aberdeen | 10/26/52 |
| Wallace M. Leonard | Ref. Mgr. Comos Refuge, Idaho | 10/27/52 |
| Mr & Mrs Joe Kennedy | Maint. Man Crescent Lake, Nebr. | 11/11/52 |
| Clarence Buer | Maint. Man Upper Souris, N. Dak. | 11/18/52 |
| F. C. Gillett | Regional Refuge Supervisor | 11/20-21/52 |
| George Wiseman | Ref. Mgr., Valentine, Nebr. | 11/20/52 |
| Frank Martin | Ref. Mgr., Upper Souris, N. Dak. | 11/21/52 |
| Bernie Nelson | State P-R Coordinator, S. Dak. | 11/25/52 |
| Harry Jensen | G.M.A. Jamestown, N. Dak. | 11/25/52 |
| J. Donald Smith | Pilot Biologist, Mpls. | 12/11/52 |
| L. C. Richardson | S. Dak. State Warden | Frequent |
| Everett L. Sutton | G.M.A. Aberdeen, S. Dak. | " |
| Jerome Stoudt | Flyway Biologist, Aberdeen, S. Dak. | " |
| Erling Podoll | State Game Technician | " |

C. Refuge Participation

The following meetings were attended by refuge personnel during the period.

| | |
|-----------------------|---|
| Hecla Sportsmens Club | : Slides and talk by Dill |
| Lakeview School | : The films Western Grebe & King Chinook were shown by Dill |
| Columbia High School | : The films Western Grebe & King Chinook were shown by Dill |
| Bath Community Club | : Talk and slides by Dill |
| Barnard P. T. A. | : Slides and talk by Dill |

D. Hunting

The waterfowl hunting season extended from October 3 through December 1. In treating goose hunting data, only the first 30 days are considered, since the goose kill after November 1 was negligible. Ducks were taken sporadically throughout the whole season.

Goose hunters congregated at 10 different preferred sites comprising 21.5 miles of boundary and within 1/2 mile of it. Data gathered daily by refuge personnel while on patrol revealed that 12,900 men hunted on these free-access areas during the 30 day period. Commercial and private hunting clubs controlling an additional 7.5 miles of boundary account for an additional 2,384 hunter days. The remainder of the boundary was hunted so little (or not at all) that its affect on the data need not be considered.

Start

Therefore, a total of 15,284 men hunted within 1/2 mile of the refuge boundary during the goose hunting period.

Bag checks of 1,941 persons hunting on the free-access areas (roads, right-of-ways, etc) revealed that they had killed 78 geese, for an extremely low success figure of .04 goose per man per day. The kill on club lands was considerably higher. 2,384 hunters killed 771 geese or .32 goose per hunter per day. This information was obtained from records kept by club owners. One club, which had a choice location this year, has not reported, and has not been included. That data would raise the club success figure slightly. However, it is known that this club killed 225 geese or more. This figure is included with the other club and free-access area kill figures for a total of 1,512 geese in the hunters bag.

Crippling loss data on the boundary areas other than club lands was so scarce as to be without value. The crippling loss last year was found to be 14 per cent of the total kill on these areas. This figure is believed to be applicable to this year's data. Club crippling losses this year were placed at 13 percent of the total club kill. Thus the total crippling loss is 197 geese, which brings the total kill to 1,709 around the refuge periphery and up to 1/2 mile outward.

Table No. 4 summarizes hunting pressure and kill information.

In past years, an attempt has been made to determine the goose kill in the areas 1/2 mile from the refuge boundary out to the maximum range of the flocks. This year, because of the low population and the fact that the geese seldom left the refuge, the kill is believed to be very slight and would not appreciably affect the total kill figures. Hunting pressure in these areas also was negligible.

Ducks were taken incidental to goose hunting during the first half of the season. During November, hunters concentrated more on ducks. Via a rough sample of hunting pressure during November we arrive at an estimate of 2,700 hunter days of use, for the last 30 days of the season. This gives a total refuge use for the hunting season of approximately 20,000 hunter days. Duck hunter success was .05 ducks per hunter day. On this basis, it is estimated that 1,000 ducks ended up in the hunters bag at Sand Lake.

E. Fishing

Carp, suckers, bigmouth buffalofish, bullhead, perch and northern pike are found in refuge waters. Northerns are the principal game fish. This year, an occasional 7 pounder was caught, although most of those taken were under 3 pounds. Some perch, suckers and bullheads are caught, but the accent is on northern pike. Fishermen gathered along the James River all fall at the Hedla recreation area, and at the bridge one mile north of the Hedla grade. Approximately 900 fisherman-days were recorded for the period.

F. Violations

TABLE NO. 4

HUNTING PRESSURE AND TOTAL ESTIMATED GOOSE KILL

| | HUNTER DAYS | GOOSE PER HUNTER DAY | GEESE IN HUNTER BAG | UNRETRIEVED % OF KILL | UNRETRIEVED GEESE | TOTAL KILL |
|---|---------------------------------------|-------------------------|------------------------|--------------------------|----------------------|------------|
| Public hunting areas along refuge boundary | 12,900 | .04 | 516 | 14 | 84 | 600 |
| Private & commercial hunting clubs | 2,384 | .32 | 771 | 13 | 113 | 884 |
| | | | 225* | | | 225* |
| Total 1952 kill | 15,284 | | 1512 | | 197 | 1709 |
| Comparable data 1951 | 12,566 | | 5400 | | 1106 | 6450 |
| Comparable data 1950 | 18,020 | | 6590 | | 2399 | 8989 |
| 1/2 mile outside refuge boundary to max. range of goose flock - 1952 | Considered: negligible see text | Negligible: | | | | |
| Comparable data 1951 | 5,026 | | 2,160 | | | 2,160 |
| Comparable data 1950 | 7,208 | | 3,222 | | | 3,222 |
| GRAND TOTALS | 1952 15,284 | | 1,512 | | 197 | 1,709 |
| | 1951 17,592 | | 7,560 | | 1,106 | 8,610 |
| | 1950 25,228 | | 9,812 | | 2,399 | 12,211 |

* This figure represents minimum known kill of club that has not reported.
Included only in total kill.

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TABLE NO. 5

SPECIES COMPOSITION OF GEESE KILLED - 1952

| | CLUBS | | PUBLIC SHOOTING | |
|----------------------|----------|-----|-----------------|-------|
| Canada goose | | | | |
| Mainly Richardson's: | 661 | 85% | 68 | 87.5% |
| White-fronted goose: | 51 | 7% | 2 | 2.5% |
| Snow goose | 38 | 5% | 8 | 10% |
| Blue goose | 21 | 3% | 8 | |
| | 771 100% | | 78 100% | |
| Total Hunters | 2,384 | | 1,931 | |



The following apprehensions were made during the 1952 hunting season:

| <u>NAME</u> | <u>VIOLATION</u> | <u>APPREHENDED BY</u> | <u>DISPOSITION</u> |
|---------------|---|-----------------------|----------------------|
| D. Hockholter | Late shooting | E. Sutton-Richardson | \$25.00 \$5.00 cost |
| A. Maxwell | Improperly plugged gun | E. Sutton | 25.00 |
| R. Fuhrman | Refuge Trespass | E. Sutton | 25.00 |
| J. Long | Late shooting | E. Sutton | 25.00 |
| E. Houck(Juv) | Late shooting-No license | R. Pratt-A. Kreg | Probation for 3 mos. |
| H. Lehr | Over limit ducks | Dill - Richardson | 15.00 5.30 costs |
| A. Geharter | " " " | " " | " " " |
| C. Nelson | Over limit N. pike | E. Sutton | 10.00 7.30 costs |
| E. R. isdorph | Late shooting | Richardson | 25.00 7.30 costs |
| M. Martinson | Shooting pheasants during closed season | E. Sutton-Richardson | 10.00 3.80 costs |
| E. Hendricks | " " " | " " | " " " |
| J. Collette | " " " | " " | " " " |
| W. Whipple | " " " | " " | " " " |
| D. Beaton | " " " | " " | " " " |
| J. Beaton | " " " | " " | " " " |
| C. Anderson | " " " | " " | " " " |
| B. Anderson | " " " | " " | " " " |
| C. Rowie | " " " | " " | 25.00 7.30 costs |
| G. Thompson | Shooting muskrat w/rifle | Richardson | 10.00 7.30 costs |

Following is the disposition of cases listed in our September-December 1951 narrative report as pending in Federal Court:

| <u>NAME</u> | <u>VIOLATION</u> | <u>DISPOSITION</u> |
|--------------------|--------------------------------|--------------------|
| N. Bauer | Hunting on refuge | \$25.00 |
| H. Eisenbeisz | " " " | 25.00 |
| H. Levi | " " " | 25.00 |
| K. Hagen | " " " | 25.00 |
| D. Templeton | " " " | 25.00 |
| H. Larson | Improperly plugged gun | 25.00 |
| N. Hofer | Hunting on refuge | 25.00 |
| W. Van Steenberger | Improperly plugged gun | 25.00 |
| C. Syljaveret | Hunting on refuge | 25.00 |
| M. Harkins | Non-resident hunting waterfowl | 100.00 7.30 costs |
| L. Sauer | Shooting geese on refuge | 25.00 |
| E. Hofer | " " " | 25.00 |
| H. Theil | Refuge trespass | 25.00 |
| E. Dilly | " " " | 25.00 |
| A. Wegner | " " " | 25.00 |

VII OTHER ITEMS

A. Items of Interest

1. Dale E. Sutherland joined the refuge staff on October 1, as Jr. Refuge Manager. He is a graduate of the University of Minnesota, and was formerly employed by the Minnesota Division of Game and Fish.

2. Refuge Mgr., Dill is working on an improved net trap to be made of nylon netting. This trap, when completed, will revolutionize the banding business (he hopes) !!

B. Easement Refuges - Dist. 5, North Dakota

Dakota Lake Easement Refuge was visited frequently throughout the period. The area was patrolled frequently during the waterfowl season.

Waterfowl did not use the area this year as they did in past years. Birds censused in the area were considered as birds from the Sand Lake flock as was done in previous years.

Maple River

Boundary signs were checked in the area prior to the waterfowl season.

Tewaukon and Clouds Lake Easement Refuges

The area was visited on October 10 to check boundary signs and repair a hole in the spillway of the Tewaukon dam. The following waterfowl were observed on that day: Mallards 5,300, Pintails 150, Green-winged Teal and Ruddy ducks 100. Fifty snow and blue geese were also observed.

The 1952 hay crop was measured on November 5. On that day there were an estimated 17,800 ducks in the area, made up of mostly mallards with some canvasbacks, green-winged teal, and American Mergansers. Nineteen swans were also observed.

Storm Lake & Lake Elsie


These areas were not visited this period. Patrol of the areas was carried out by North Dakota wardens in connection with their regular work.

C. Photographs

All photographs were taken by Dill and Sutherland.

Credits: Sections I, III, IV, VI & VII - R. C. Pratt
Sections II D. Sutherland
Section V H. Dill

Submitted by


Herbert H. Dill

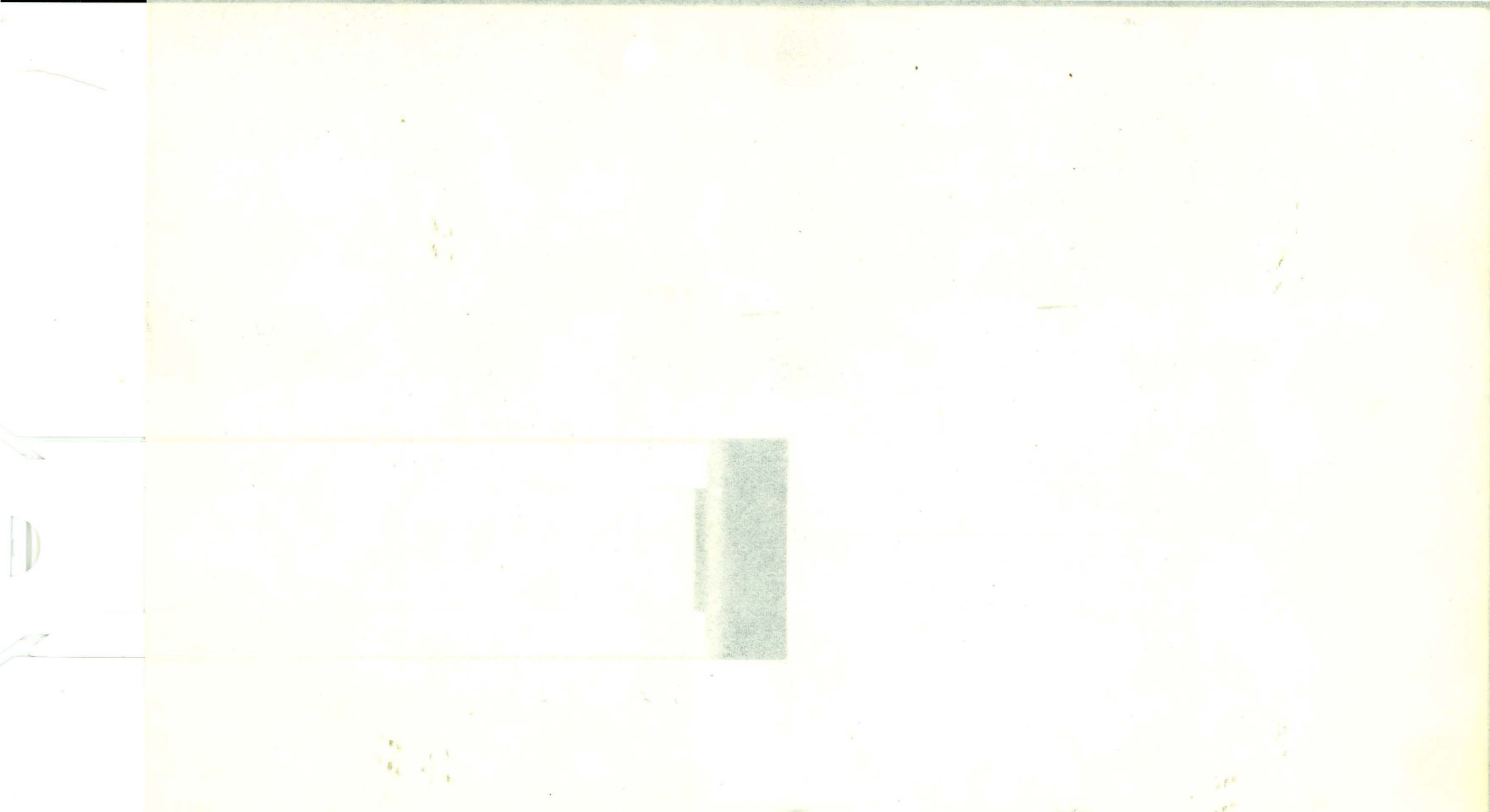
January 20, 1953

Approved: Regional Office



SD-SDL-564

About 300 mallards caught December 19 under the net. Note leading edge has been pursed which increases efficiency of trap. Of these, 239 were banded. Steve Felix in background wearing necklace of bands.



A close up showing how mallards will run around under the net. Note leading edge of net, center foreground, which was pursed while net was in flight. This increases size of catch and prevents escapes in front.



SO-30L-505


Fewer geese were present on the refuge this fall; catches in the boom trap were smaller than those of a year ago. Richardson's & Snows with Dale Sutherland cranking camera in background.



SO- 50L-546

Another aerial shot by Don Smith with K20 camera, showing
portion of wintering population of mallards.

These aerial shots were made by Don Smith, Pilot-biologist with K20 camera. There are a total of approximately 6,500 mallards which represent our wintering population.



These mallards were using the open water area just below
the Mud Lake dam. This is a favorite wintering spot.



SD-50L-50

White-spotting among Canada geese is fairly common. This bird is an adult Richardson; however, this is not an indication of old age - as many hunters believe. The neck marker as described in text. Agent Everett Sutton holding bird.

SD-50L-50



Processing geese which were held to obtain weights and measurements. The gent with the sinister look is Everett Sutton.



SD. SDL.

Messers Stoudt & Sutton hold three adult geese all of which weigh between 7 and 8 pounds. The top bird has typical Richardson's bill and voice; bottom two are honkers.



SO-SOL-54

Strip mowing in the heavier stands of marginal vegetation increases periphery and is intended to improve quality of nesting habitat. Ray Murdy standing in uncut weeds.



SO-SOL-55

Fifty nine coons and two badgers taken by refuge trapper, Clare Johnson. Heaviest coon weighed 40 pounds and coons over 20 pounds are the rule here; the largest we have seen anywhere.



30-30L-512

Fishing at the Hecla recreation area in December.
Considerable ingenuity is exercised by fishermen in
rigging up automatic line-tenders.

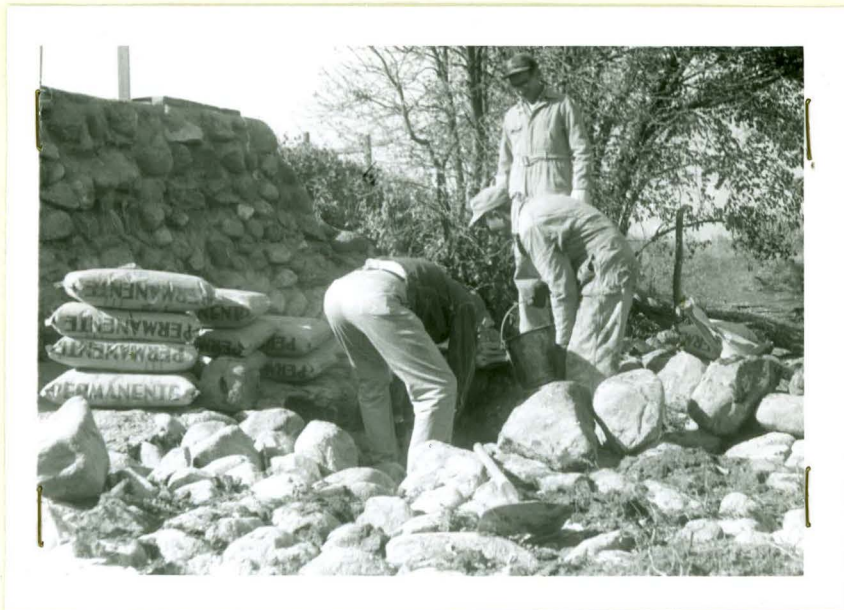


30-30L-513



SD-SDL-5

This picture was taken about 2 PM. These fellows had been fishing since 4 AM. Results - two northernns about 4 pounds each.



SD-50L-575

Repairs to the Tesaukon dam. Rubble-masonry seems to have a way of coming unstuck! Dick Pratt, Refuge Clerk, background.



SD-50L-576

The completed job is inspected by Maintenance Man, Fritz Krege.



SO-30L-

Elmer Podoll, Refuge Mechanic, works on Gorman-Rupp pump in refuge shop.



50-504-570

H ow about that?

WATERFOWL

Refuge Sand LakeMonths of Septemberto December 1952

| (1) Species | | (2) First Seen | | (3) Peak Concentration | | (4) Last Seen | | (5) Young Produced | | (6) Total |
|---------------------|---------------------------|-------------------|-------|---------------------------|------------------|--|-------|-----------------------|-----------------|----------------------|
| Common Name | | Number | Date | Number | Date | Number | Date | Broods Seen | Estimated Total | Estimated for period |
| I. <u>Swans</u> : | | | | | | | | | | |
| Whistling swan | | 5 | 10/10 | 61 | 11/23 | 2 | 12/8 | | | 1569 use day |
| II. <u>Geese</u> : | | | | | | | | | | |
| Rich. | Canada goose | resident | | 18,500 | 10/23 | 20 remain at end of period | | | | 327,800 |
| | Cackling goose | | | (500 Richardson's | first seen 9/18) | | | | | |
| | Brant | | | | | | | | | |
| | White-fronted goose | 40 | 9/18 | 1,000 | 10/17 | 2 | 11/6 | | | 11,600 |
| | Snow goose | 200 | 10/7 | 2,700 | 10/29 | 2 | 11/28 | | | 52,400 |
| | Blue goose | 50 | 10/7 | 300 | 10/29 | 2 | 11/28 | | | 6,500 |
| | | | | 22,500 | | | | | | 98,300 |
| III. <u>Ducks</u> : | | | | | | | | | | |
| Mallard | | Resident | | 225,000 | 11/18 | 6,500 remain at end of period | | | | |
| Black duck | | " | | 200 | 9/9 | Unknown number remain at end of period | | | | |
| Gadwall | | " | | 700 | 9/9 | | | | | |
| Baldpate | | " | | 700 | 9/9 | | | | | |
| Pintail | | " | | 15,000 | 9/9 | 5 | 11/21 | | | |
| Green-winged teal | | " | | 1,200 | 9/9 | 4 | 11/19 | | | |
| Blue-winged teal | | " | | 3,500 | 9/9 | | | | | |
| Cinnamon teal | | " | | | | | | | | |
| Shoveller | | " | | 8,000 | 9/29 | 4 | 11/19 | | | 6,337,000 |
| Wood duck | | " | | | | | | | | |
| Redhead | | " | | 50 | 9/29 | 2 | 11/12 | | | |
| Ring-necked duck | | " | | 5 | 9/9 | 5 | 9/9 | | | |
| Canvas-back | | " | | 1,400 | 10/23 | 2 | 11/12 | | | |
| Scaup | | " | | 10 | 10/7 | 2 | 11/11 | | | |
| Golden-eye | | 2 | 10/26 | | | | | | | |
| Buffle-head | | 3 | 11/12 | 3 | 11/12 | 3 | 11/12 | | | |
| Ruddy duck | | Resident | | 40 | 10/27 | | | | | |
| m. Merganser | | 5 | 11/5 | 300 | 11/12 | 300 | 11/12 | | | |
| Hooded Merganser | | Resident | | | | | | | | |
| IV. <u>Coot</u> : | | | | 9000 | 10/23 | 10 | 10/29 | | | |

Including Dakota Lake populations as there is a continual movement of birds, (mainly geese) between the two areas.

SUMMARIES

Dates waterfowl counts made 9/9, 9/29, 10/7, 17, 23,
29, Nov. 6, 12, 25, Dec. 12, 23.

Percent of waterfowl area covered 100%

Dates brood counts made _____

Percent of area covered in brood counts _____

Total production:

Geese _____

Ducks _____

Coots _____

Total waterfowl usage during period 6,736,869

Peak waterfowl numbers 225,000

Areas used by concentrations Mud Lake and Sand Lake Units

Principal nesting areas this season _____

Reported by Dale E. Sutherland

INSTRUCTIONS

- (1) Species: In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance.
- (2) First seen: The first refuge record for the species during the season concerned in the reporting period, and the number seen. This column does not apply to resident species.
- (3) Peak concentration: The greatest number of the species present in a limited interval of time.
- (4) Last seen: The last refuge record for the species during the season concerned in the reporting period.
- (5) Young produced: Estimated number of young produced based on observations and actual counts on representative breeding areas. Brood counts should be made on two or more areas aggregating 10% of the breeding habitat. Estimates having no basis in fact should be omitted.
- (6) Total: Estimated total number of the species using the refuge during the period. This figure may or may not be more than that used for peak concentrations, depending upon the nature of the migrational movement.

Note: Only columns applicable to the reporting period should be used. It is desirable that the Summaries receive careful attention since the data are necessarily based on an analysis of the rest of the form.

3-1751

Form NR-1A

(Nov. 1945)

MIGRATORY BIRDS
(other than waterfowl)Refuge Sand LakeMonths of Septemberto December19452

| (1) Species | (2) First Seen | | (3) Peak Numbers | | (4) Last Seen | | (5) Production | | | (6) Total |
|----------------------------------|-------------------|------|---------------------|------|------------------|-------|-------------------|---------------|-------------|------------------|
| Common Name | Number | Date | Number | Date | Number | Date | Number Colonies | Total # Nests | Total Young | Estimated Number |
| I. <u>Water and Marsh Birds:</u> | | | | | | | | | | |
| Western grebe | Summer resident | | | | 2 | 10/7 | | | | |
| Pied-billed grebe | " | " | | | | | | | | |
| White pelican | " | " | 6,500 | 9/9 | 2 | 11/12 | | | | |
| Double-crested cormorant | " | " | 3,000 | 9/9 | 12 | 10/17 | | | | |
| Great blue heron | " | " | | | 2 | 11/6 | | | | |
| American bittern | " | " | | | | | | | | |
| Sandhill crane | 2 | 10/9 | 2 | 10/9 | 2 | 10/9 | | | | |
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(over)

| (1) | (2) | (3) | (4) | (5) | (6) |
|--------------------------------|-----|-------|-----|-------|------------------------------|
| III. Doves and Pigeons: | | | | | |
| Mourning dove | | | | | |
| White-winged dove | | | | | |
| IV. Predaceous Birds: | | | | | |
| Golden eagle | 4 | 10/17 | 4 | 10/17 | One remains at end of period |
| Duck hawk | | | | | |
| Horned owl | 2 | 10/8 | 6 | 10/11 | Two remain at end of period |
| Magpie | | | | | |
| Raven | | | | | |
| Crow | | | | | |
| Bald eagle | 2 | 11/28 | 2 | 11/28 | 1 still present |
| Snowy owl | 1 | 12/18 | 1 | 12/18 | 1 still present |
| Reported by Dale E. Sutherland | | | | | |

INSTRUCTIONS

- (1) Species: Use the correct names as found in the A.O.U. Checklist, 1931 Edition, and list group in A.O.U. order. Avoid general terms as "seagull", "tern", etc. In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance. Groups: I. Water and Marsh Birds (Gaviiformes to Ciconiiformes and Gruiformes)
II. Shorebirds, Gulls and Terns (Charadriiformes)
III. Doves and Pigeons (Columbiformes)
IV. Predaceous Birds (Falconiformes, Strigiformes and predaceous Passeriformes)
- (2) First Seen: The first refuge record for the species for the season concerned.
- (3) Peak Numbers: The greatest number of the species present in a limited interval of time.
- (4) Last Seen: The last refuge record for the species during the season concerned.
- (5) Production: Estimated number of young produced based on observations and actual counts.
- (6) Total: Estimated total number of the species using the refuge during the period concerned.

1613

Months of September to December, 1942

[illegible]

INSTRUCTIONS

Form NR-2 - UPLAND GAME BIRDS.*

- (1) SPECIES: Use correct common name.
- (2) DENSITY: Applies particularly to those species considered in removal programs (public hunts, etc.). Detailed data may be omitted for species occurring in limited numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager as to the number of acres in each cover type found on the refuge; once submitted, this information need not be repeated except as significant changes occur in the area of cover types. Cover types should be detailed enough to furnish the desired information but not so much as to obscure the general picture. Examples: spruce swamp, upland hardwoods, reverting agriculture land, bottomland hardwoods, short grass prairie, etc. Standard type symbols listed in Wildlife Management Series No. 7 should be used where possible. Figures submitted should be based on actual observations and counts on representative sample areas. Survey method used and size of sample area or areas should be indicated under Remarks.
- (3) YOUNG PRODUCED: Estimated number of young produced, based upon observations and actual counts in representative breeding habitat.
- (4) SEX RATIO: This column applies primarily to wild turkey, pheasants, etc. Include data on other species if available.
- (5) REMOVALS: Indicate total number in each category removed during the report period.
- (6) TOTAL: Estimated total number using the refuge during the report period. This may include resident birds plus those migrating into the refuge during certain seasons.
- (7) REMARKS: Indicate method used to determine population and area covered in survey. Also include other pertinent information not specifically requested.

* Only columns applicable to the period covered should be used.

3-1753
Form NR-3
(June 1945)

BIG GAME

Refuge Grand Lake Calendar Year 1952

| (1) Species | (2) Density | (3) Young Produced | (4) Removals | | | | (5) Losses | | | (6) Introductions | | (7) Estimated Total Refuge Population | | (8) Sex Ratio |
|----------------------|--|--------------------------|-----------------|---------------------|------|-----------------|---------------|---------|----------------|----------------------|--------|--|---------------------|---------------------|
| Common Name | Cover types, total Acreage of Habitat | Number | Hunting | For Re- stocking | Sold | For Research | Predation | Disease | Winter Loss | Number | Source | At period of Greatest use | As of Dec. 31 | |
| White-tailed deer | Marsh and wooded upland 12,000 acres Winter big game census will be made during January, 1953 and results will be reported in a future R/R. | 75 | | | | | | | | | 275 | 225 | | |

Remarks:

Reported by _____

INSTRUCTIONS

Form NR-3 - BIG GAME

- (1) SPECIES: Use correct common name; i.e., Mule deer, black-tailed deer, white-tailed deer. It is unnecessary to indicate sub-species such as northern or Louisiana white-tailed deer.
- (2) DENSITY: Detailed data may be omitted for species occurring in limited numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager as to the number of acres in each cover type found on the refuge; once submitted, this information need not be repeated except as significant changes occur in the area of cover types. Cover types should be detailed enough to furnish the desired information but not so much as to obscure the general picture. Examples: spruce swamp, upland hardwoods, reverting agriculture land, bottomland hardwoods, short grass prairie, etc. Standard type symbols listed in Wildlife Management Series No. 7 should be used where possible. Figures submitted should be based on actual observations and counts on representative sample areas. Survey method used and size of sample area or areas should be indicated under Remarks.
- (3) YOUNG PRODUCED: Estimated total number of young produced on refuge.
- (4) REMOVALS: Indicate total number in each category removed during the year.
- (5) LOSSES: On the basis of known records or reliable estimates indicate total losses in each category during the year.
- (6) INTRODUCTIONS: Indicate the number and refuge or agency from which stock was secured.
- (7) TOTAL REFUGE POPULATION: Give the estimated population of each species on the refuge at period of its greatest abundance and also as of Dec. 31.
- (8) SEX RATIO: Indicate the percentage of males and females of each species as determined from field observations or through removals.

3-1755
Form NR-5
(April 1946)

DISEASE

Refuge Sand Lake Refuge

Year 19452

Botulism or toxic algae
poisoning

Lead Poisoning or other Disease

Period of outbreak Aug. 14 to Sept. 14, 1952

Kind of disease Lead shot poisoning

Period of heaviest losses Aug. 3 to Sept. 6, 1952

Species affected Mallard, Pintail

Losses:

| | Actual Count | Estimated |
|-----------------------------------|--------------|------------|
| (a) Waterfowl | <u>34</u> | <u>500</u> |
| (b) Shorebirds | <u>28</u> | <u>200</u> |
| (c) Other <u>Franklin's gulls</u> | <u>2</u> | |

| Number Affected Species | Actual Count | Estimated |
|----------------------------|--------------|--------------|
| <u>2</u> | <u>200</u> | <u>5,000</u> |
| | | |
| | | |

Number Hospitalized No. Recovered % Recovered

Number Recovered 4,000

| | | |
|----------------|--|--|
| (a) Waterfowl | | |
| (b) Shorebirds | | |
| (c) Other | | |

Number lost 1,000

Areas affected (location and approximate acreage)

Source of infection Lead shot ingested in areas other than the refuge

Water conditions Water levels lowest since late '30's.

Water conditions (average depth of water in sickness areas, reflooding of exposed flats, etc.)

Food conditions Good supply wild foods and abundance of cultivated grains and corn

Conditions of vegetation and invertebrate life

Remarks

Remarks

Refuge Sand LakeYear 1945

| Species | Relative Abundance | Sport Fishing | | Commercial Fishing | | Restocking | | Number removed for Restocking |
|------------------|--------------------|------------------|-------------------|--------------------|--------------|----------------|--------------|-------------------------------|
| | | Man days Fishing | Number Taken | No. of Permits | Pounds Taken | Number Stocked | Area Stocked | |
| Carp | Abundant | | | | | | | |
| Bigmouth Buffalo | common | | | | | | | |
| Sucker | few | | | | | | | |
| Bullhead | Abundant | | | | | | | |
| Perch | " | | | | | | | |
| Croppie | Few | | | | | | | |
| Bluegill | " | | | | | | | |
| Northern Pike | common | 900 | Insufficient data | | | | | |

REMARKS:

PLANTINGS
(Marsh - Aquatic - Upland)

Refuge Sand Lake Year 1945

| Species | Location of Area Planted | Rate of Seeding or Planting | Amount Planted (Acres or Yards of Shoreline) | Amount & Nature of Propagules | Date of Planting | Survival | Cause of Loss | Remarks |
|---|---|-----------------------------|--|-------------------------------|------------------|----------|---------------|--|
| Japanese millet Wild Millet Smartweed | Shorelines & Mud flats Sand Lake Hq. | | 300 acres | | June | Poor | Flooding | Seed washed out |
| Multiflora rose | Headquarters | 500 plants | | | June | zero | Drouth | Experimental |
| Caragana Green ash American Elm Cottonwood | Shelterbelt Silo bay (Point) | Standard (SCS) | | | June | Unknown | Drouth | Survival to be re-checked in spring 1953 |
| Red cedar | Headquarters | 50 ea. | | | June | 25% | Drouth & wind | |

TOTAL ACREAGE PLANTED:

Marsh and aquatic 300 acres
Hedgerows, cover patches _____
Food strips, food patches _____
Forest plantings _____

CULTIVATED CROPS

Refuge Sand Lake Year 195 2

| Permittee (If farmed by refuge personnel, so indicate) | Permit No. | Unit or Loca- tion | Crops Grown | Avg. Yield per Acre | Permittee's Share | | Government's Share or Return | | | | Compensatory Services, or Cash Revenue |
|--|---------------|-----------------------------|----------------|------------------------------|----------------------|--------------------|------------------------------|-----|-------------|------|--|
| | | | | | Acres | Bu. Har- vested | Harvested | | Unharvested | | |
| | | | | | | | Acres | Bu. | Acres | Bu. | |
| Dennert, S. | SL-27-1952 | 3-4-6-7 | Wheat | 8 | 10 | 80 | 20 | 240 | | | |
| | | | Barley | 12 | 20 | 240 | | | | | |
| | | | Oats | 20 | 78 | 1560 | | | | | |
| | | | Corn | 30 | 10 | 300 | | | | | |
| | | | Millet | 12 | | | | | | | |
| Dinger, G. | SL-42-1952 | 11 | Barley | 12 | 19 | 228 | | | 36 | 432 | |
| | | | Oats | 20 | 67 | 1340 | | | | | |
| | | | Corn | 30 | 56 | 1680 | | | 34 | 1020 | |
| Biehler, H. | SL-37-1952 | 43 | Wheat | 8 | 19 | 152 | | | | | |
| | | | Oats | 20 | 14 | 280 | | | | | |
| | | | Corn | 30 | 9 | 270 | | | 9 | 270 | |
| | | | Millet | 12 | | | | | 12 | 144 | |
| Herseth, R. | SL-40-1952 | 35-37 | Wheat | 8 | 120 | 960 | 15 | 120 | | | |
| | | | Barley | 12 | 11 | 132 | 15 | 180 | | | |
| | | | Corn | 30 | | | | | 18 | 540 | |
| | | | Millet | 12 | | | | | 17 | 204 | |

| Summary of Crops Grown: | Crop | Acreage | Permittee's Share | | Government's Share | | | | Total Revenue |
|--|------|---------|-------------------|---------|--------------------|-----|-------------|-----|---------------|
| | | | Acres | Bushels | Harvested | | Unharvested | | |
| | | | | | Acres | Bu. | Acres | Bu. | |
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| Interior Duplicating Section, Wash. D. C. | | | | | | | | | |
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DIRECTIONS FOR PREPARING FORM NR-8
CULTIVATED CROPS

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Average Yield per Acre - It is important that the average yield per acre of each crop grown by each operator should be shown.

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Compensatory Services, or Cash Revenue - Show other services received by the Government in cooperative farming activities, the number of acres of food strips planted for wildlife, the amount of wildlife crops not otherwise reported that are planted by cooperators for the Service, or the cultivation of wildlife plantations. If the permit is on a fee basis, the total cash revenue received by the Service.

CULTIVATED CROPS

Refuge Sand Lake Year 1952

| Permittee (If farmed by refuge personnel, so indicate) | Permit No. | Unit or Loca- tion | Crops Grown | Avg. Yield per Acre | Permittee's Share | | Government's Share or Return | | | | Compensatory Services, or Cash Revenue |
|--|---------------|-----------------------------|----------------|------------------------------|----------------------|--------------------|------------------------------|-----|-------------|-----|--|
| | | | | | Acres | Bu. Har- vested | Harvested | | Unharvested | | |
| | | | | | | | Acres | Bu. | Acres | Bu. | |
| Koch, W. | SL-33-1952 | 17-21-22-23 | Barley | 12 | 40 | 480 | 20 | 240 | | | |
| | | | Oats | 20 | 60 | 1200 | | | | | |
| | | | Corn | 30 | 12 | 360 | 38 | 82 | 33 | 990 | |
| | | | Willet | 12 | | | | | 13 | 156 | |
| Lawman, F. | SL-45-1952 | 25 | Barley | 12 | 42 | 504 | | | 14 | 168 | |
| Witchell, E. | SL-35-1952 | 29 | Corn | 30 | 15 | 450 | | | 5 | 150 | |
| Olson, C. | SL-38-1952 | 44 | Barley | 12 | 20 | 240 | | | | | |
| | | | Oats | 20 | 16 | 320 | | | | | |
| | | | Corn | 30 | 2 | 60 | | | 14 | 420 | |
| | | | Willet | 12 | | | | | 5 | 60 | |
| Pfutzenreuter, G. | SL-31-1952 | 9 - 10 | Barley | 12 | 30 | 360 | | | 30 | 360 | |
| | | | Oats | 20 | 61 | 1220 | | | 2 | 40 | |
| | | | Corn | 30 | 15 | 450 | | | 21 | 630 | |
| Richardson, E. | SL-36-1952 | 41-42 | Wheat | 8 | 143 | 1144 | | | | | |
| | | | Barley | 12 | 22 | 264 | | | 8 | 96 | |
| | | | Corn | 30 | | | | | 25 | 750 | |

| Summary of Crops Grown: | Crop | Acreage | Permittee's Share | | Government's Share | | | | Total Revenue |
|-------------------------|------|---------|-------------------|---------|--------------------|-----|-------------|-----|---------------|
| | | | Acres | Bushels | Harvested | | Unharvested | | |
| | | | | | Acres | Bu. | Acres | Bu. | |
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Interior Duplicating
Section, Wash.D.C.

DIRECTIONS FOR PREPARING FORM NR-8
CULTIVATED CROPS

Cultivated Crops Report Form NR-8 should be prepared on a calendar-year basis for all crops harvested or utilized during the calendar year and submitted with the December 31 refuge report.

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CULTIVATED CROPS

Refuge Sand Lake Year 1952

| Permittee (If farmed by refuge personnel, so indicate) | Permit No. | Unit or Loca- tion | Crops Grown | Avg. Yield per Acre | Permittee's | | Government's Share or Return | | | | Compensatory Services, or Cash Revenue |
|--|---------------|-----------------------------|----------------|------------------------------|-------------|--------------------|------------------------------|-----|-------------|-----|--|
| | | | | | Share | | Harvested | | Unharvested | | |
| | | | | | Acres | Bu. Har- vested | Acres | Bu. | Acres | Bu. | |
| Weismantel, E. | SL-24-1952 | 45 | Wheat | 8 | 17 | 136 | | | | | |
| | | | Oats | 20 | 17 | 340 | | | | | |
| | | | Corn | 30 | 1 | 30 | | | 16 | 480 | |
| | | | Willet | 12 | | | | | 3 | 36 | |
| Wells, E. | SL-43-52 | 1 | Wheat | 8 | 39 | 312 | 13 | 101 | | | |
| | | | Oats | 25 | 12 | 300 | 4 | 100 | | | |
| Wilson, J. | SL-47-52 | 40 | Wheat | 8 | 35 | 280 | | | 17 | 136 | |
| | | | Barley | 12 | | | | | 28 | 336 | |
| | | | Oats | 20 | 53 | 1060 | | | 17 | 340 | |
| | | | Willet | 12 | | | | | 14 | 168 | |
| | | | Corn | 30 | 23 | 690 | | | 29 | 870 | |
| Alfalfa: | | | | | | | | | | | |
| As of December 31, we have received 4,322 pounds of alfalfa seed as our share of the crop, with approximately another 1,000 pounds yet to be delivered. We are asking the permittees to clean the seed before they deliver it to us so that it can be shipped to the different refuges ready to be sown. | | | | | | | | | | | |

| Summary of Crops Grown: | Crop | Acreage | Permittee's Share | | Government's Share | | Total Revenue | |
|-------------------------|--------|---------|-------------------|---------|--------------------|------|----------------------|------|
| | | | Acres | Bushels | Harvested Acres | Bu. | Unharvested Acres | Bu. |
| | Wheat | 1500 | 1142 | 2592 | 41 | 325 | 17 | 136 |
| | Barley | 451 | 304 | 1223 | 75 | 1071 | 102 | 1224 |
| | Oats | 465 | 436 | 9170 | 12 | 370 | 17 | 340 |
| | Corn | 531 | 253 | 7590 | 8 | 230 | 29 | 870 |
| | Willet | 169 | | | | | 169 | 2024 |

Interior Duplicating
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CULTIVATED CROPS

Refuge Lake Towaukon

Year 195 2

| Permittee (If farmed by refuge personnel, so indicate) | Permit No. | Unit or Loca- tion | Crops Grown | Avg. Yield per Acre | Permittee's Share | | Government's Share or Return | | | | Compensatory Services, or Cash Revenue |
|--|---------------|-----------------------------|----------------|------------------------------|----------------------|--------------------|------------------------------|-----|-------------|-----|--|
| | | | | | Acres | Bu. Har- vested | Harvested | | Unharvested | | |
| | | | | | | | Acres | Bu. | Acres | Bu. | |
| Lee, O. | SL-48-1952 | C-1 | Oats | 20 | 22 | 440 | | | 11 | 220 | |
| Thornberg, B. | SL-50-1952 | C-2 | Barley | 12 | 30 | 360 | | | 17 | 204 | |
| | | | Millet | 12 | | | | | | | |
| Skroch, T. | SL-49-1952 | C-3 | Wheat | 8 | 36 | 288 | | | 25 | 300 | |
| | | | Oats | 20 | 15 | 300 | | | | | |
| | | | Rye | 10 | 25 | 250 | | | | | |
| | | | Millet | 12 | | | | | | | |
| | | | Corn | 30 | | | | | | | |
| | | | | | | | | | 25 | 600 | |

| Summary of Crops Grown: | Crop | Acreage | Permittee's Share | | Government's Share | | | | Total Revenue |
|-------------------------|--------|---------|-------------------|---------|--------------------|-----|----------------------|-----|---------------|
| | | | Acres | Bushels | Harvested Acres | Bu. | Unharvested Acres | Bu. | |
| | Oats | 37 | 26 | 520 | | | 11 | 220 | |
| | Wheat | 36 | 36 | 288 | | | | | |
| | Barley | 30 | 30 | 360 | | | | | |
| | Rye | 25 | 25 | 250 | | | | | |
| | Corn | 25 20 | 25 8 | 240 | | | 12 | 360 | |
| | Millet | | | | | | 12 | 504 | |

Interior Duplicating
Section, Wash. D. C.

DIRECTIONS FOR PREPARING FORM NR-8
CULTIVATED CROPS

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REFUGE GRAIN REPORT

Refuge Sand Lake

Months of September thru December 1945

| (1) VARIETY | (2) ON HAND BEGINNING OF PERIOD | (3) RECEIVED DURING PERIOD | (4) TOTAL | (5) GRAIN DISPOSED OF | | | | (6) ON HAND END OF PERIOD | (7) PROPOSED USE | | |
|--------------------|--|-------------------------------------|----------------------------------|--------------------------|--------|-----|-------|------------------------------------|---------------------|------|----------------------------------|
| | | | | TRANS- FERRED | SEEDED | FED | TOTAL | | SEED | FEED | SURP. |
| Wheat | 530 | 325 | 855 | 290 | | 40 | 330 | 525 | | 300 | 225 |
| Barley | 2780 | 1071 | 3851 | 110 | | 110 | 220 | 2560 | | 2000 | 560 |
| Corn | 600 | 230 | 830 | 480 | | 250 | 370 | 100 | | 100 | - - |
| Oats | 540 | 370 | ⁵⁴⁰ 910 | 60 | | 35 | 95 | ⁴⁴⁵ 815 | | 125 | ³²⁰ 690 |

(8) Indicate shipping or collection points.....

(9) Grain is stored at Site No. 2. Grain Elevator.....

(10) Remarks.....

NR-8a REFUGE GRAIN REPORT

This report should cover all grain on hand, received, or disposed of, during the period covered by this narrative report.

Report all grain in bushels. For the purpose of this report the following approximate weights of grain shall be considered equivalent to a bushel: Corn (shelled)—55 lbs., Corn (ear)—70 lbs., Wheat—60 lbs., Barley—50 lbs., Rye—55 lbs., Oats—30 lbs., Soy Beans—60 lbs., Millet—50 lbs., Cowpeas—60 lbs., and Mixed—50 lbs. In computing volume of granaries, multiply the cubic contents (cu. ft.) by 0.8 bushels.

- (1) List each type of grain separately: Corn, wheat, proso millet, etc. Include only domestic grains; aquatic and other seeds will be listed on NR-9.
- (3) Report all grain received during period from all sources, such as transfer, share-cropping, or harvest from food patches.
- (4) A total of Columns 2 and 3.
- (6) Column 4 less Column 5.
- (7) This is a proposed breakdown by varieties of grain listed in Column 6.
- (8) Nearest railroad station for shipping and receiving.
- (9) Where stored on refuge: "Headquarters grainary", etc.
- (10) Indicate here the source of grain shipped in, destination of grain transferred, data on condition of grain, unusual uses proposed.

COLLECTIONS AND RECEIPTS OF PLANTING STOCK
(Seeds, rootstocks, trees, shrubs)Refuge Sand LakeYear 19452

| Species | Collections | | | | Receipts | | Total Amounts on Hand | Amount Surplus |
|-----------------|-------------|------------------------------------|--------|-----------|----------|---------------|-----------------------------|-------------------|
| | Amount | Date or Period or Collection | Method | Unit Cost | Amount | Source | | |
| Brome grass | | | | | 100 lbs | Glade Refuge | 100 lbs | none |
| Japanese millet | | | | | 1500 lbs | Swan Lake | | |
| Smartweed | | | | | 500 lbs | Swan Lake | | |
| Trees & shrubs | | | | | | | | |
| Red cedar | | | | | | | | |
| Cottonwood | | | | | | | | |
| American Elm | | | | | | SCS- Brown- | | |
| Green Ash | | | | | | Marshall Soil | | |
| Caragana | | | | | | District. | | |
| Multiflora rose | | | | | 500 ea. | Crab Orchard | | |

HAYING AND GRAZING

Refuge Sand Lake Year 19452

| Permittee | Permit No. | Unit or Location | Actual Acreage Utilized | Animal Use Months | Tons of Hay Harvested | Period of Use From - To | Rate | Total Income | Remarks |
|----------------|------------|----------------------|-------------------------|-------------------|-----------------------|-------------------------|------|--------------|----------|
| <u>GRAZING</u> | | | | | | | | | |
| Crawford, G. | SL-61-1952 | 1 | 160 | 72 | | 7/16/52 - 11/15/52 | 1.00 | 72.00 | |
| Mitchell, E. | SL-63-1952 | 3 | 320 | 256 | | " " | 1.00 | 210.66 | |
| Scott, P. W. | SL-62-1952 | 2 | 120 | 120 | | " " | 1.00 | 120.00 | |
| <u>HAYING</u> | | | | | | | | | |
| Bruns, L. W. | SL-58-1952 | Portions of Unit # 3 | 100 | | 48.88 | 7/15/52-2/28/53 | 1.50 | 73.32 | |
| Gerdes, E. | SL-59-1952 | Portions of Unit #3 | 100 | | 95.97 | " " | 1.50 | 143.99 | |
| Herseth, C. | SL-55-1952 | 9 | 45 | | 87.10 | " " | 1.50 | 130.65 | |
| Herseth, R. | SL-57-1952 | 13 | 95 | | 31.54 | " " | 1.50 | 47.31 | |
| Koch, W. | SL-52-1952 | 1 | 100 | | 17.40 | " " | 1.50 | 26.10 | (Credit) |
| Pearson, H. W. | SL-53-1952 | 2 | 40 | | 20.77 | " " | 1.50 | 31.15 | |
| Salling, D. R. | SL-54-1952 | 7 | 60 | | 46.00 | " " | 1.50 | 69.00 | |
| Scott, A. | SL-64-1952 | 5 | 160 | | 89.62 | " " | 1.50 | 134.43 | |
| Stensland, E. | SL-71-1952 | F.U. 16-18 | 100 | | 92.00 | " " | 1.50 | 138.00 | |
| Tunby, O. | SL-56-1952 | 10 | 40 | | 17.00 | " " | 1.50 | 25.50 | |
| Vitense, R. | SL-60-1952 | 16 | 10 | | 4.86 | " " | 1.50 | 7.30 | |

Totals:

Acreage grazed 600 Animal use months 448 Total income Grazing 4132.66
Acreage cut for hay 850 Tons of hay cut 551.14 Total income Haying 8774.55

HAYING AND GRAZING

Refuge Lake Tewauckon Year 1945

| Permittee | Permit No. | Unit or Location | Actual Acreage Utilized | Animal Use Months | Tons of Hay Harvested | Period of Use From - To | Rate | Total Income | Remarks |
|---------------|------------|------------------|-------------------------|-------------------|-----------------------|-------------------------|------|--------------|----------|
| | | | | <u>GRAZING</u> | | | | | |
| Skroch, T. | SL-66-1952 | G-2 | 50 | 84 | | 7/15/52-11/16/52 | 1.00 | 84.00 | |
| | | | | <u>HAYING</u> | | | | | |
| Gelenske, J. | SL-67-1952 | H-1 | 30 | | 15.80 | 7/16/52-2/28/53 | 1.50 | 23.70 | |
| Skroch, T. | SL-68-1952 | H3 | 15 | | 2 | " " | 1.50 | 2.25 | (Credit) |
| Thornberg, B. | SL-69-1952 | H-2 | 15 | | 46.73 | " " | 1.50 | 70.10 | |

Totals:

| | | | | | |
|--------------------------|----|------------------------|--------|---------------------------|-------|
| Acreage grazed..... | 50 | Animal use months..... | 104.00 | Total income Grazing..... | 84.00 |
| Acreage cut for hay..... | 60 | Tons of hay cut..... | 64.53 | Total income Haying..... | 91.55 |